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| <b>R.P. Hugtenburg, A.L. Yusoff and D.A. Bradley</b>  | 655 | Near-edge anomalous Rayleigh scattering in Cu ions  |
| <b>Jorge E. Fernández and Viviana Scot</b>  | 657 | Scattering computation on two targets using the vector code MCSHAPE   |
| <b>Kulwant Singh and Leif Gerward</b>   | 659 | Molar extinction coefficients for describing gamma-ray attenuation in solutions   |
| <b>Z. Kaliman, N. Orlić and I. Jelovica</b>   | 661 | Polarization effects in Compton scattering from K-electrons   |
| <b>L.A. LaJohn and R.H. Pratt</b>   | 665 | Higher multipole high energy radiation transition matrix element zeros  |
| <b>V.R.K. Murty</b>   | 667 | Effective atomic numbers for W/Cu alloy for total photon attenuation  |
| <b>V.R.K. Murty and K.R.S. Devan</b>  | 671 | Photon interaction cross sections in the low energy region in Mg and V  |
| <b>N. Govinda Nayak and K. Siddappa</b>   | 673 | Experimental atomic form factors of some rare earth and heavy elements by coherent scattering of 145.4 keV gamma rays   |
| <b>O.I. Obolensky, A.V. Korol and R.H. Pratt</b>  | 677 | Trajectories of matrix element zeroes   |
| <b>S.C. Roy, B.K. Chatterjee and R.H. Pratt</b>   | 679 | An alternative method to calculate inelastic scattering cross sections of photons   |
| <b>P. Thanomngam and P.N. Johnston</b>  | 681 | Compton scattering from the K-shell electrons of Ta and Pb  |

**Radiation Sources and Detectors****Invited papers**

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| <b>M.I. Lopes and V. Chepel</b> | 683 | Detectors for medical radioisotope imaging: demands and perspectives |
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- D. Einfeld, S.S. Hasnain, Z. Sayers, H. Schopper and H. Winick 693 SESAME, a third generation synchrotron light source for the Middle East region

### **Contributed papers**

- Rodolfo Figueroa and Marcia García 701 Resolution and sensitivity for an alternative X-ray fluorescence method: SEICXRF
- Peter Kozma and Petr Kozma, Jr. 705 Radiation resistance of heavy scintillators to low-energy gamma-rays

### **Poster papers**

- D. Bisello, A. Candelori, P. Giubilato, A. Kaminski, A. Litovchenko, D. Pantano, R. Rando and J. Wyss 709 Radiation hardness of semiconductor detectors for high energy physics applications
- D. Bisello, A. Candelori, A. Kaminski, A. Litovchenko, E. Noah and L. Stefanutti 713 X-ray radiation source for total dose radiation studies
- D. Bisello, A. Candelori, P. Giubilato, A. Kaminski, D. Pantano, R. Rando, M. Tessaro and J. Wyss 717 The SIRAD irradiation facility for radiation damage studies induced by high-energy ions
- J.A.S. Barata and C.A.N. Conde 721 Monte Carlo calculations of drift velocities of Ne<sup>+</sup> ions in helium
- L.M.N. Távora, C.A.N. Conde, F.P. Santos, T.H.V.T. Dias and P.J.B.M. Rachinhas 723 Intrinsic limitations in the energy resolution of drift-field based radiation detectors: a Monte Carlo simulation study of Xe-filled counters
- Bob D'Mellow and Malcolm J. Joyce 727 Calibration of gas-filled proton recoil detectors
- J.A. Gaskin, D. Sharma, B. Ramsey and P. Seller 731 Evaluation of a cadmium-zinc-telluride focal plane detector for hard X-ray astronomy
- M. Msimanga, M. McPherson and C. Theron 733 Fabrication and characterisation of gold-doped silicon Schottky barrier detectors
- R. Sarkar, B.K. Chatterjee, B. Roy and S.C. Roy 735 Size distribution of drops in superheated drop detectors
- G. Sarabayrouse, D. Buchdahl, V. Polischuk and S. Siskos 737 Stacked-MOS ionizing radiation dosimeters: potentials and limitations
- N.V. Novikov, L.K. Shvedov, V.D. Dobrovolsky, Y.N. Krivosheya and O.G. Radchenko 741 Apparatus for X-ray diffraction analysis at high pressures
- N. Takata, T. Kurosawa and N.T. Tran 743 Wall correction factors and angle dependence of signal currents from cylindrical ionization chambers
- L. Erradi, E. Chakir, A. Htet, T. Elbardouni and A. Chetaine 745 Analysis of KRITZ and KAMINI reactivity temperature coefficient benchmarks

## **Radiation Physics in Space, Earth, and the Environment**

### **Invited papers**

- F.D. Brooks, A. Buffler and M.S. Allie 749 Detection of anti-personnel landmines using neutrons and gamma-rays

<b>David D. Cohen, David Garton, Eduard Stelcer and Olga Hawas</b>	759	Accelerator based studies of atmospheric pollution processes
<b>R.J. de Meijer, E.R. van der Graaf and K.P. Jungmann</b>	769	Quest for a nuclear georeactor
<b>Bernd Wernsperger and Clemens Schlosser</b>	775	Noble gas monitoring within the international monitoring system of the comprehensive nuclear test-ban treaty
<b>Poster papers</b>		
<b>Mustafa Bakac</b>	781	R-mode factor analysis applied to the distribution of radionuclides in Turkey
<b>Dobrosława Budka, Jolanta Mesjasz-Przybyłowicz and Wojciech J. Przybyłowicz</b>	783	Environmental pollution monitoring using lichens as bioindicators: a micro-PIXE study
<b>Dobrosława Budka, J. Mesjasz-Przybyłowicz and W.J. Przybyłowicz</b>	785	Micro-PIXE analysis: importance of biological sample preparation techniques
<b>C. Calza, M.J. Anjos, C.R.F. Castro, R.C. Barroso, F.G. Araujo and R.T. Lopes</b>	787	Evaluation of heavy metals levels in the Paraíba do Sul River by SRTXRF in muscle, gonads and gills of <i>Geophagus brasiliensis</i>
<b>M. Azahra, C. González-Gómez, J.J. López-Peñalver, T. El Bardouni, A. Camacho García, H. Boukhal, F. El Moussaoui, E. Chakir, L. Erradi, A. Kamili and A. Sekaki</b>	789	The seasonal variations of $^7\text{Be}$ and $^{210}\text{Pb}$ concentrations in air
<b>N.O. Hashim, I.V.S. Rathore, A.M. Kinyua, R.L. Stangl and A.O. Mustapha</b>	791	Assessment of quality of trace element measurements by EDXRF technique: a statistical approach
<b>K. Jakovčić, Z. Krečak, M. Krčmar and A. Ljubičić</b>	793	A search for solar hadronic axions using $^{83}\text{Kr}$
<b>James Larkin, Henk Coetzee, Shaun Guy and John Watterson</b>	795	Environmental radioactivity in South Africa
<b>R. Lindsay, R.J. de Meijer, A.D. Joseph, T.G.K. Motlhabane, R.T. Newman, S.A. Tsela and W.J. Speelman</b>	797	Measurement of radon exhalation from a gold-mine tailings dam by $\gamma$ -ray mapping
<b>J.A. Mars, D. Gihwala, W.J. Przybyłowicz, B. Bladergroen and V. Linkov</b>	799	$\mu$ -IBA analysis of $\text{Al}_2\text{O}_3$ - $\text{ZrO}_2$ tubes to be used in wastewater purification
<b>J. Dobrinić, N. Orlić and Z. Kaliman</b>	801	Trace elements in environmental samples determined by X-ray spectroscopy
<b>A.S. Paschoa</b>	803	Gamma spectrometry—a simple probe for measuring soils with DU, NU and LEU
<b>N.O. Hashim, I.V.S. Rathore, A.M. Kinyua and A.O. Mustapha</b>	805	Natural and artificial radioactivity levels in sediments along the Kenyan coast

- B. Masschaele, M. Dierick, V. Cnudde, L. Van Hoorebeke, S. Delputte, A. Gildemeister, R. Gaehler and A. Hillenbach** 807 High-speed thermal neutron tomography for the visualization of water repellents, consolidants and water uptake in sand and lime stones
- S. Sandri, A. Coniglio, L. Di Pace and M. Pillon** 809 Radiological safety of ITER personnel during normal operation and maintenance of the divertor

### Radiation in Materials Science

#### *Invited papers*

- J.E. Macdonald, M. Durell, D. Trolley, C. Lei, A. Das, P.C. Jukes, M. Geoghegan, A.M. Higgins and R.A.L. Jones** 811 Applications of grazing incidence diffraction to polymer surfaces
- Klas G. Malmqvist** 817 Accelerator-based ion beam analysis—an overview and future prospects
- H. Schenk and R. Peschar** 829 Understanding the structure of chocolate

#### *Poster papers*

- M.R. Chandratillake** 837 Overestimation of the stable molecular product yields in radiolysis
- D.C. Creagh, G. Thorogood, M. James and D.L. Hallam** 839 Diffraction and fluorescence studies of bushranger armour
- P.M. O'Neill, D.C. Creagh and M. Sterns** 841 Studies of the composition of pigments used traditionally in Australian Aboriginal bark paintings

### Radiation Physics Technology and Industry

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- C.M. Bartle, C. Kroger and J.G. West** 843 New uses of X-ray transmission techniques in the animal-based industries
- Andy Buffler** 853 Contraband detection with fast neutrons
- E. Dooryhée, P. Martinetto, Ph. Walter and M. Anne** 863 Synchrotron X-ray analyses in art and archaeology
- G. Harding** 869 X-ray scatter tomography for explosives detection

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- W.L. Dunn** 883 Measurement of lubricant thickness on needles using proton scattering
- T. El Bardouni, A. Mouadili, E. Chakir, F. El Moussaoui, M. Azahra, H. Boukhal, L. Erradi, A. Kamili and A. Sekaki** 885 Study of thermal to 14 MeV neutron conversion in Triga reactor: application to averaged cross section measurement
- A.L. Yusoff, R.P. Hugtenburg and D.A. Bradley** 887 XANES in doped radiosensitive glasses
- S.A. Jonah and I.M. Umar** 889 Estimating adulteration of petroleum-based fuels using neutron reflectometry technique

<b>Peter Kozma and Petr Kozma Jr.</b>	891	Radiation damage of solar cells
<b>J.C. Lee</b>	893	Spatial characteristics of the secondary-particle-emitting atomic sites around a gamma-ray source
<b>M. Pillon, M. Angelone and R.A. Forrest</b>	895	Measurements of fusion-induced decay heat in materials and comparison with code predictions
<b>V. Valković, S. Blagus, D. Sudac, K. Nad and D. Matika</b>	897	Inspection of shipping containers for threat materials

### Radiation Physics in Medicine and Biology

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<b>Masami Ando, Hiroshi Sugiyama, Anton Maksimenko, Edward Rubenstein, Joseph Roberson, Daisuke Shimao, Eiko Hashimoto and Koichi Mori</b>	899	X-ray dark-field imaging and its application to medicine
<b>Richard Neutze, Gösta Huldt, Janos Hajdu and David van der Spoel</b>	905	Potential impact of an X-ray free electron laser on structural biology
<b>S.M. Qaim</b>	917	Use of cyclotrons in medicine
<b>T. Vilaithong, L.D. Yu, P. Apavatjirut, B. Phanchaisri, S. Sangyuenyongpipat, S. Anuntalabhochai and I.G. Brown</b>	927	Heavy ion induced DNA transfer in biological cells

#### Contributed papers

<b>C.A. Pineda-Vargas, M.E. Eisa, U.M.E. Chikte and J.L. Conradie</b>	937	High-resolution nuclear microprobe elemental mapping of teeth enamel-dentine interface exposed to acidic conditions
<b>E. Menapace, C. Birattari, M.L. Bonardi and F. Groppi</b>	943	Experimental results and model calculations of excitation functions relevant to the production of specific radioisotopes for metabolic radiotherapy and for pet
<b>C.A. Pineda-Vargas, A.L. Rodgers and M.E. Eisa</b>	947	Nuclear microscopy of human kidney stones, comparison between two population groups

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<b>Layla Ali, E.M. Green, R.E. Ellis, D.A. Bradley, J.G. Grossmann and C.P. Winlove</b>	951	Study of the molecular and supramolecular organisation of elastic tissue by X-ray diffraction
<b>Layla Ali, D.A. Bradley, R.E. Ellis, E. Green, J.G. Grossmann and C.P. Winlove</b>	953	The structure and organisation of type-IV collagen in normal and glycosylated basement membrane
<b>M. Assiamah, T.L. Nam and R.J. Keddy</b>	957	Dosimetric techniques for mammography X-ray beams
<b>C.P. Winlove, R.E. Ellis, E.M. Green, P.G. Petrov and D.A. Bradley</b>	959	The organization of lipids in monolayers at the air-water interface using glancing angle X-ray diffraction (GIXD)

<b>P. Muthuvelu, R.E. Ellis, B. Sheldon, D. Attenburrow, R. Barrett, M. Drakopoulos, C.P. Winlove and D.A. Bradley</b>	961	Investigations of vascularisation and blood flow at the subchondral plate using an X-ray fluorescence technique
<b>J.P.J. Carney, J.T. Yap and D.W. Townsend</b>	963	PET count rate performance and CT image quality of a 16-slice LSO PET/CT for clinical whole-body imaging
<b>E.A. de Kock</b>	967	Pencil beam convolution model for fast-dose calculations in uncharged particle radiation treatment planning
<b>K. Geraki, M. Farquharson and D. Bradley</b>	969	X-ray fluorescence and energy dispersive X-ray diffraction for the characterisation of breast tissue
<b>E. Ryan and M.J. Farquharson</b>	971	Angular dispersive X-ray scattering from breast tissue using synchrotron radiation
<b>M.E. Poletti and O.D. Gonçalves</b>	973	Scattering investigation on the suitability of hydrophilic materials as breast-equivalent materials
<b>M.E. Poletti, O.D. Gonçalves, C.A. Pérez and S.D. Magalhães</b>	975	A preliminary study of the distribution of trace elements in healthy and neoplastic breast tissues with synchrotron radiation X-ray fluorescence
<b>O.D. Gonçalves, S.C. Cardoso, H. Schechter and J. Eichler</b>	977	Multiple scattering of 59.54 keV $\gamma$ -rays by large water samples: measurements and simulation
<b>F. Saeedi, Z. Yin and R.P. Hugtenburg</b>	979	Dosimetry in conditions of electron disequilibrium
<b>K.J. Bhengu, K.M. Langen, J.E. Symons and D.T.L. Jones</b>	981	Thermoluminescence dosimetry in a fast neutron therapy beam
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<b>D. McLean, J. Varas and N. Khaidukov</b>	995	Initial thermoluminescent dosimetry experience with $K_2YF_5$ materials using beta and X-ray sources
<b>S.C. Roy and G.A. Sandison</b>	997	Scattered neutron dose equivalent to a fetus from proton therapy of the mother
<b>R.D. Perez, M. Rubio, C.A. Perez, F. Ausar, D. Beltramo, A. Germanier and I. Bianco</b>	999	Applications of SR-XRF to characterize biogels obtained by irradiation of aqueous biopolymers solutions

- Z. Banach, J. Borowska, E. Pyza and G. Tylko** 1001 X-ray microanalysis method of elemental content evaluation in the brain of *Musca domestica* exposed to heavy metals

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- M.J. Key, V. Cindro and M. Lozano** 1003 On the radiation tolerance of SU-8, a new material for gaseous microstructure radiation detector fabrication
- C. Celiktas, S. Selvi and G. Yegin** 1009 Improving the resolution of beta scattering spectroscopy
- A.R. Milosavljević, S. Telega, D. Šević, J.E. Sienkiewicz and B.P. Marinković** 1015 Elastic electron scattering by argon in the vicinity of the high-energy critical minimum

## Radiation Chemistry

- Hanna B. Ambroź, Terence J. Kemp, Alison Rodger and Grażyna Przybytniak** 1023 Ferric and ferrous ions: binding to DNA and influence on radiation-induced processes
- Grigoriy A. Mun, Zauresh S. Nurkeeva, Sabit M. Koblanov, Vitaliy V. Khutoryanskiy and Erengaip M. Shaikhutdinov** 1031 Radiation synthesis of polyampholyte hydrogels based on vinyl ether of monoethanolamine and sodium acrylate and their interactions with linear polyelectrolytes
- M.K. Temgire and S.S. Joshi** 1039 Optical and structural studies of silver nanoparticles

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- V. Vijayabaskar, S. Bhattacharya, V.K. Tikku and Anil K. Bhowmick** 1045 Electron beam initiated modification of acrylic elastomer in presence of polyfunctional monomers
- Dae Hoon Jeon, Kwang Ho Lee and Hyun Jin Park** 1059 The effects of irradiation on physicochemical characteristics of PET packaging film
- J.P. Maity, A. Chakraborty, A. Saha, S.C. Santra and S. Chanda** 1065 Radiation-induced effects on some common storage edible seeds in India infested with surface microflora

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- M.K. Raghavendra and C.R. Ramaswamy** 1073 Study of low-energy internal Bremsstrahlung radiation from  $^{147}\text{Pm}$
- N.A. Hussein, A. Shukri, A.A. Tajuddin and C.S. Chong** 1077 LAXS investigation of finger phantoms

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- M.S. Alam, M. Kelm, B.S.M. Rao and E. Janata** 1087 Reaction of  $\text{H}^{\bullet}$  with  $\text{H}_2\text{O}_2$  as observed by optical absorption of perhydroxyl radicals or aliphatic alcohol radicals and of  $^{\bullet}\text{OH}$  with  $\text{H}_2\text{O}_2$ . A pulse radiolysis study

**Jin Jun, Jo-Chun Kim,  
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and Young Soon Baek**

- 1095 Effect of electron beam irradiation on CO<sub>2</sub> reforming of methane over Ni/Al<sub>2</sub>O<sub>3</sub> catalysts

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**L. Varshney and P.B. Dodke**

- 1103 Radiation effect studies on anticancer drugs, cyclophosphamide and doxorubicin for radiation sterilization

**Birol Engin and Hayrünnisa Demirtaş**

- 1113 The use of ESR spectroscopy for the investigation of dosimetric properties of egg shells

#### Technical note

**M. Mansour and F. Mohamad**

- 1125 Effects of gamma radiation on codling moth, *Cydia pomonella* (L.), eggs

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